but, nevertheless, a perusal of the controversy between Mendeléeff and Meyer shows, I think, that Meyer arrived at the fundamental conception of the periodic law independently of Mendeléeff. Those who are interested in such controversies will find papers by Mendeléeff and Meyer in *Berichte* xiii. pp. 259, 1796, 2043 [1880].

In his discourse to the German Chemical Society on May 29, 1893, "Ueber den Vortrag der unorganischen Chemie nach dem natürlichen Systeme der Elemente," Meyer quotes the words which Laurent had used fifty years before concerning organic chemistry, and applies them to the teaching of inorganic chemistry at the present time:—*que l'arbitraire y règne sans partage.* If these words can be applied to the teaching of inorganic and general chemistry to-day, how much more fully and literally were they applicable at the time when the first edition of Meyer's "Die Modernen Theorien" appeared thirty years ago! That book has probably done more than any other publication within the twenty years after 1864 to advance the study of comparative chemistry; its influence on the conception of chemistry as an accurate and orderly body of facts and principles has been very great, and has been wholly good. The labour bestowed on the preparation of the first edition of the "Modern Theories" must have been immense. The author speaks in his preface of rewriting the MS. three times. It is true that thirty years ago physical chemistry was practically non-existent, that the facts of organic chemistry could be mastered and held by a man with an ordinary memory, and that one might be a chemist without first being a mathematical physicist. But it is also true that the facts of inorganic chemistry had not been coordinated by the luminous conception of the periodic law, that there was a lack of clearness in the notions of most chemists about the structure of organic compounds—for Kekulé had not yet made his famous ride on the top of the Clapham omnibus—and that the many isolated facts regarding the influence of temperature, time, and the masses of the reacting bodies, on chemical changes had not been gathered together and illuminated by the law of mass action and the conceptions arising from the applications of this law. It was then that "Die Modernen Theorien" appeared; and at once a flood of light was thrown on the whole domain of chemical science. Old problems were made clear, and new problems were suggested. Chemistry entered on its modern phase.

As the study of comparative chemistry progressed—a study which was introduced by the enunciation of the periodic law—it became necessary to know with accuracy the analytical bases whereon rested the values accepted for the atomic weights of the elements. Hence Lothar Meyer was induced to devote a large amount of labour to the somewhat thankless task of recalculating these values; the result of this work, carried out with the help of his colleague Prof. Seubert, appeared in 1883. This work received additional value from the fact that it appeared almost at the same time as Clarke's "Recalculation of the Atomic Weights." Every worker in this department has the data of all previous workers brought to his hand, and presented in the most manageable form.

Besides these two treatises bearing on general chemistry, Lothar Meyer was an investigator in the sphere of experimental chemistry. He has published memoirs on subjects in almost every branch of the science; on the atomic weight of beryllium, on determinations of vapour densities, on the combustion of carbon monoxide, on the preparation of hydriodic acid, on the transpiration of gases, on various organic compounds, and on other matters.

A great chemist has passed away from us; his work remains, and that work will ever be held in remembrance.

M. M. PATTISON MUIR.

NOTES.

THE Institute of France has decided to solicit subscriptio for the erection of a statue to Lavoisier at Paris. It is intende to make the appeal an international one, so that all admirers of Lavoisier may do honour to the memory of one of the creators of modern science. Subscriptions may be sent to the Treasurer of the Committee for the Lavoisier Memorial, 55 quai des Grands-Augustins, Paris.

THE centenary of the Institute of France is to be celebrated next October. The *Times* states that on the 24th of that month the foreign representatives invited to the celebration will be received, and the Minister of Education will hold a reception. On the following day M. Faure will attend a ceremony at the Sorbonne, and a banquet will be held. There will also be a dramatic entertainment and a reception at the Elysée. Chantilly, the future property of the Institute, will be visited on the 27th, by permission of the Duc d'Aumale.

LIVERPOOL, determined that the visit of the British Association in 1896 shall be a success, has taken time by the forelock. At an influential meeting held in the Town Hall last week, it was announced that an executive working committee had been appointed thoroughly representative of the inhabitants of Liverpool and the neighbourhood. The Chairman is the Right Hon. the Lord Mayor of Liverpool, the Vice-Chairmen are Sir W. B. Forwood and Mr. E. K. Muspratt; the Hon. Treasurer, Reginald Bushell, and the Hon. Secretaries, Prof. W. A. Herdman, F.R.S., Mr. J. C. Thompson, and Mr. W. E. Willink. The meeting was very enthusiastic, and the keynote running through the various speeches was to the effect that the welcome extended to the members of the British Association should not in any direction be allowed to compare unfavourably with that at the meeting at Manchester in 1887, which in the matter of subscriptions at present holds the record. From the short statement made by the Hon. Treasurer, this hope seems likely to be realised. Without making any public appeal for funds, but simply putting the matter before a few of his more influential friends, the Hon. Treasurer was able to make the gratifying statement that no less than £1350 had been subscribed. The Committee preferred a subscription list to a guarantee fund, and in this they are no doubt well advised. A donor, however, is not entitled to any privileges as a member of the British Association, by reason of his subscription, but to every subscriber of £10 a member's ticket or two associate tickets will be given, and one associate ticket to subscribers of £5. With this early start, Liverpool ought to have no difficulty in raising the £5000 which Sir W. Forwood regards as the minimum sum required for a successful and record meeting.

THIS year's conversazione of the Society of Arts will be held in the South Kensington Museum on Wednesday evening, June 19.

DR. THORNE THORNE, C.B., F.R.S., has been appointed a member of the General Medical Council for five years, in place of Sir John Simon, resigned.

MR. GEORGE MURRAY has been appointed Keeper of Botany in the British Museum, in succession to Mr. Carruthers, who retires on superannuation.

THE death is announced of Dr. H. F. C. Cleghorn, well known for his work in connection with the organisation and development of the Forest Department of India. He was for some years president of the Royal Scottish Arboricultural Society, and examiner in forestry to the Highland Society. He also took a leading part in the founding of the forestry lectureship in the University of Edinburgh.

The munificent gift made by Mr. Seth Low, ex-Mayor of Brooklyn, and now President of Columbia College, to that college, at a meeting of the trustees a few days ago, places him in the front rank of the world's benefactors. One million dollars for a library building, twelve scholarships for Columbia College for Brooklyn boys, and twelve to Barnard College for Brooklyn girls, eight university scholarships and a university fellowship, make a list of gifts rarely equalled. At the same meeting, Mr. C. Schermerhorn presented 300,000 dollars for a new building. Then the Townsend library, a complete compilation of all the printed matter relating to the American Civil War, in eighty-nine volumes of 600 pages each, larger than an ordinary ledger, which was begun six months before the war, and is the result of thirty-three years of unceasing labour by Thomas S. Townsend, was formally presented to the college, together with an encyclopædia of reference to it, and 4000 dollars to complete the encyclopædia.

The trustees at the same meeting, following the recommendation made by the National Academy of Sciences at their recent meeting, awarded the Barnard medal to Lord Rayleigh for the discovery of argon. This gold medal, which has a value of 200 dollars, is awarded every five years to the investigator who makes within the preceding five years the most valuable discovery in physics or astronomy, in accordance with the will of President F. A. P. Barnard, who died in 1889, and was the immediate predecessor of Mr. Seth Low.

The Brooklyn Institute has just sustained a great loss in the retirement of General John B. Woodward, who has been president for eighteen years, covering the entire epoch of the great development and expansion of the Institute. He will be succeeded by Mr. A. Augustus Healy.

Sir William Dawson has sent us a printed statement, in which he traverses the arguments against the organic nature of *Eozoon Canadense*, brought forward by Dr. J. W. Gregory and Prof. Johnston-Lavis, in a recent paper entitled "Eozoonal Structure of the Ejected Blocks of Monte Somma," noted in our issue of January 10 (p. 251). He states a number of facts which indicate "that the specimens of Eozoon found in the Laurentian limestone of Canada in no respect resemble in their associations and mode of occurrence the banded forms from Mount Somma described in the paper in question."

A strong earthquake disturbance of about five seconds' duration occurred at Florence at nine o'clock on the evening of Saturday last, and was felt at Bologna four minutes earlier. Two hours later another shock was felt. Many of the houses in Florence were injured by the movements, but the damage appears to have been greater in the surrounding villages—Grassina, Lapaggi, and San Martino, where the church was destroyed. At Orezzo the earthquake is said to have lasted ten seconds, and there were two distinct shocks at Siena. The movement was strongly marked at Parma, and to a less degree at Pisa and Placentia. Reuter's correspondent at Spoleto reports that severe shocks were also felt there on Monday evening.

A general meeting of the Federated Institution of Mining Engineers will be held in London on Thursday, May 30, and on Friday, May 31. The presidential address will be given by Mr. W. N. Atkinson on the Thursday. The papers to be read on the same day are:—Notes on bauxite in County Antrim, &c., and its uses, by Mr. George G. Blackwell; sampling, by Mr. T. Clarkson; blasting explosives, by Prof. Vivian B. Lewes; and the gold-milling process at Pestarena, by Mr. A. G. Charleton. At the meeting on May 31 the following papers will be read, or taken as read:—Remarks on the banket formation of Johannesburg, Transvaal, by Mr. A. R. Sawyer; the composition of the extinctive atmospheres produced by various flames and by respiration, by Prof. Frank Clowes; the composition of the limiting explosive mixtures of various gases with air, by Prof. Frank Clowes; the mineral oils of Lower Elsass, by Dr. L. van Werveke; copper-mining in India, by Mr. Robert Oates; the recent magnetic survey of the United Kingdom, by Prof. A. W. Rücker; the MacArthur-Forrest process, by Mr. John McConnell.

In consequence of the renewed attacks upon the Conservators of Epping Forest, another large and influential meeting of the Essex Field Club was held on Saturday last, under the conductorship of Mr. Edward North Buxton, Prof. Boulger, Prof. Meldola, and the hon. secretaries. More than 100 members and visitors were present, among them being many residents in the district and lovers of the Forest, as well as such well-known experts as Prof. W. R. Fisher, of Cooper's Hill, and Mr. Angus D. Webster. The districts visited were those about which complaints had been made by a certain class of newspaper correspondents, viz. Bury Wood, the so-called Clay Ride, and Monk Wood. Beyond a few personal discussions between the conductors and experts and one or two of those who had been criticising the action of the Conservators, no public ventilation of views was permitted, as the conductors were of opinion that a mere inspection of the places named would enable the members and their friends to form their own conclusions. The party assembled at the King's Oak at High Beach for tea, after which an ordinary meeting of the Club was held, the President, Mr. David Howard, taking the chair. Mr. E. N. Buxton explained a scheme which he had been carrying out for the purpose of affording protection to the birds of the Forest district. By enlisting the sympathies and securing the co-operation of the surrounding landowners, he had succeeded in obtaining a promise that a total area of some 20,000 acres, including the 6000 acres of Forest, should constitute a sanctuary within which no rare or interesting birds should be destroyed. The President indicated that such an organisation as the Essex Field Club was well calculated to enforce by example and precept the desirability of protecting both animals and plants. Mr. F. C. Gould, in reply to those correspondents who had stated that the birds were becoming rarer in Epping Forest, said that this was quite contrary to the facts. Birds were never so plentiful in the Forest as they had been during the past few years, and Mr. Gould gave a list of species which had been observed by his son in the course of one day. After tea the party proceeded to the more northern part of the Forest, and inspected Epping Thicks. Although no formal division on the question of the management of the Forest was taken, the majority could not help expressing their admiration at the skill and judgment with which this year's thinnings had been effected. Many of those present also expressed some anxiety that the Conservators might be influenced by the newspaper correspondence, and allow the Forest to degenerate by acceding to the request recently made by a deputation to the Committee that no further thinning should be allowed for a period of five years.

A spell of very cold weather for the time of year was experienced last week over the entire area of the British Isles, owing to a depression which, at the time of our last issue, lay over Denmark, and caused strong gales from north and north-west over the North Sea. The temperature fell about 30° over the inland parts of England, while snow and hail were reported from many places. On several nights the sheltered thermometer fell to within a few degrees of the freezing-point, and actually reached it in the east and west of Scotland, on the morning of the 17th instant; while the highest day readings have in many parts failed to reach 50°, a temperature which is fully 10° below the average. During the first part of the present week a depression which had spread westwards from Germany, caused a continuation of cold, gloomy weather over our islands.

Some years ago the desirability of publishing the observations made by the late J. Allan Broun at Trevandrum, in Southern India, for over twelve years, was brought before the Royal Society of London by the Royal Society of Edinburgh, and the records were deposited at the Meteorological Office for safe keeping. The Meteorological Council subsequently drew the attention of the Royal Society to the subject, and that body induced the Indian authorities to render this valuable material accessible to scientific men, the result being that the Meteorological Department of India has just published the barometrical and thermometrical observations in vol. vii. of their *Memoirs*. The publication contains the hourly observations and means from January 1853 to December 1864, with the exception of Sundays, on which no observations were taken. The whole of the original entries have been carefully examined for clerical errors, under the superintendence of Mr. J. Eliot, the Government Meteorological Reporter, and we gather from the preface that a discussion of the results will eventually be carried out.

A most eloquent appeal for the wider diffusion of a knowledge of sanitary matters has been recently made by Dr. Carlo Ruata, Professor at the University of Perugia, in his introductory address to a course of lectures on the duties of sanitation. Efficient sanitation, urges Dr. Ruata, may justly be demanded as a right by the individual from the State; but, at the same time, each individual must be adequately impressed with his duties and responsibilities to other members of society in the proper conduct of sanitary matters. It is pointed out how much may be, and has been, done by judicious legislation and enlightened public opinion in recent years; but Dr. Ruata would insist upon more vigorous measures, and upon a knowledge of the principles of hygiene being rendered compulsory in systems of education. Ignorance and lack of all sense of responsibility is only too frequently to blame for the generation and spread of disease, and Dr. Ruata's appeal, that proper hygienic conduct should be insisted upon as the serious duty which one member of society owes to another is fully justified. Dr. Ruata is confident that with improved hygienic conditions society will benefit not only physically but morally; but whether it will bring about the utopian state sketched by the lecturer in his sanguine peroration, remains yet to be seen.

A report, by Mr. P. G. Craigie, on the agricultural experiment stations and agricultural colleges in the United States, just published as a Parliamentary Paper, should be seen by every one interested in agricultural education and research. It appears that, at the present day, upwards of three-score collegiate institutions are engaged in the United States wholly or partly in agricultural teaching, and, according to the statistics collected and published for 1892, they enjoy an aggregate revenue of £689,000, practically one half of which was granted by the Federal Government, while £223,000 is added by the several States, minor aid being rendered by £40,000 which came from fees, and by the benevolence of local committees or private individuals, while the remainder was raised by the sale of farm produce or miscellaneous receipts. The number of separate experiment stations is fifty-four, of which forty-eight receive subventions from the Federal Government out of national funds, the uniform grant being roughly £3000 to each station. According to the returns published of the revenue of these stations in 1892, upwards of a million dollars, or roughly £200,000, is available as annual revenue, the Federal Government finding £140,000, and the grants of the States reaching rather more than £30,000.

Mr. Craigie's report bears out his conclusion that "great and practical energy is being directed to the discovery of the best means of extending the field of agricultural and horticultural knowledge. It should not be overlooked that side by side with the growth of local stations a very extensive development of the scientific staff engaged on the special inquiries of the Federal Department at Washington has taken place in the last ten years. The American Government seems willing to face any cost to the community that promises the better to equip the farmer with a knowledge of his business. The authorities seem assured that in indicating methods of profitable production, and still more by the careful perfecting of the produce of the vast lands of the Republic, in whatever directions of extensive or of intensive culture the economic circumstances of the moment may prescribe, they are providing a solid means of advancing the well-being of the nation as a whole."

A fresh addition to periodical literature is the *Journal of the South-Eastern Agricultural College*, Wye, Kent, which is to be published three times a year, and is intended to be a brief record of the history of the college from term to term, and to announce the results of investigations and experiments conducted by the college or members of its staff, together with other observations that may seem of interest to the agriculture of the counties of Kent and Surrey. The first number contains a description, with a plan, of the farm attached to the college, together with an account of the dairy school, of the water supply of the college, and of the field experiments which are being instituted. Mr. F. V. Theobald's notes on poultry parasites would appear to open out an instructive field of inquiry. Mr. J. Percival gives an abstract of a paper, already published, relating to eelworms in hop plants, their ravages resulting in the condition of the plants known as "nettle-headed." The nematode *Heterodera Schachtii* attacks so many kinds of plants, that its presence in hops was quite to be looked for. No reference seems to be made to the value which hop-growers set upon rape as a "trap-plant" for enticing the eelworms away from the infested crop. If future numbers are as attractive as this one, the publication is likely to prove acceptable to those in whose interest it is issued.

In a recent number of the *Bulletin Geol. Soc. America*, Messrs. G. K. Gilbert and F. P. Gulliver give an interesting account of the remarkable "tepee buttes" that occur abundantly in the neighbourhood of Pueblo, Colorado. Using the term "butte" to denote steep-sided hills with narrow summits, which may be of very various origin, the authors mention the various types of buttes (volcanic necks, geyser deposits, &c.), and discuss this particular form. They are low hills, less than twenty feet in height, that owe their origin to the resistance to denudation of peculiar vertical masses of limestone occurring in the shales of the Pierre series (Upper Cretaceous). The limestone is composed of shells, chiefly of *Lucina* and *Inoceramus*, united by a matrix of shell-fragments, foraminifera and clay. This structure of the limestone, in comparison with that of the calcareous concretions that occur normally throughout the shale, negatives its concretionary origin, nor does it resemble the spring-deposited masses of limestone known elsewhere. It is concluded that particular local conditions determined the establishment of colonies of Mollusca that continued for generations at these spots, though what these conditions may have been it is not easy to explain. Attention is called to the description, by Dr. Bell, of similiar limestone masses in Devonian shales in Canada.

The motion of a pianoforte wire when struck has been investigated by Herr W. Kaufmann, whose paper on the subject in *Wiedemann's Annalen* is accompanied by a set of very interesting photographic records, obtained by a modification of the method invented by Raps and Krigar-Menzel. By vibrating the wire in front of a luminous slit, and throwing the image of it upon sensitive paper rotating upon a cylinder, a white line is traced upon a black ground. This line, which is due to the interruption of the luminous slit by the opaque wire, exhibits all the motions of the particular point in the wire which is crossed by the slit. In order to bring the plane of the slit into exact coincidence with the wire, an image of the slit, produced by a lens with the aid of the electric arc, was thrown upon the wire itself. Since the hammer struck the wire at the point photographed, the motion of the wire was traced from the very first, the commencement of the vibration being the most interesting stage. Hard and soft hammers were tried, the latter corresponding to those actually used in the piano. It was found that the duration of contact is longer with feeble than with hard striking. As the force increases, the duration of contact rapidly approaches a limiting value equal to that of a hard hammer of equal weight. But the practically most important resultant was the proof that when a wire is struck at a point between one-seventh and one-ninth of its length, the fundamental tone has a maximum, and the harmonics—especially the third—are very feeble. Hence a wire thus struck gives its strongest and richest tone. This fact is acted upon by piano-builders, but is not explained by supposing that the nodes of the higher harmonics are struck, thus preventing their being heard. They are heard, but are outweighed by the more harmonious ones.

An interesting paper on the magnetisation of iron in very weak fields, by W. Schmidt, appears in the current number of *Wiedemann's Annalen*. The author uses the magnetometer method slightly modified, a compensating coil being placed on the opposite side of the magnetometer to the magnetising coil The effect of the iron under investigation on the magnetometer needle is compensated by passing a known current through an independent coil of large radius, so that the method is a "zero" one. A Duprez-d'Arsonval galvanometer was used to measure the current, its constant being determined by means of standard Clark cells. The samples of iron and steel under investigation had the form of ellipsoids, the semi-minor axis being 3 m.m. and the semi-major axis 200 m.m. for one set of experiments, and 150 m.m. for the other. The curves obtained for iron and steel show that for fields up to 0·06 C.G.S. units the susceptibility is constant, thus confirming Lord Rayleigh's results. As the magnetising field increases between 0·06 and 0·4 units, the curve giving the relation between the magnetising force and the susceptibility is a straight line. The author sums up the results of his experiments as follows:—Steel follows weak magnetising forces more quickly than iron. The susceptibility of soft steel is for small magnetising forces greater than that of iron. Thus for fields less than 0·06 C.G.S. unit the susceptibility of soft steel is to that of iron in the ratio of 4 to 3. For magnetising fields of about 1 unit the susceptibility of the two is about the same, while for greater field strengths the susceptibility of iron is greater than that of steel. The limits within which the susceptibility remains constant vary considerably for different samples, but the author considers that 0·06 C.G.S. unit may be taken as the upper limit with sufficient accuracy for most purposes.

The May number of the *Irish Naturalist* well sustains the reputation for utility and general interest which has been obtained by this periodical. Mr. R. M. Barrington gives an interesting sketch of the career and writings of the late Mr. A. G. More, a naturalist of unusual versatility, who has contributed greatly to our knowledge of Irish Natural History. Mr. Robert Warren writes on the Breeding Birds of Loughs Conn, Carra, and Mask. Dr. R. Hanitsch gives a brief but valuable account of the Fresh-water Sponges of Ireland. The distribution of these forms presents certain features of peculiar interest. The eastern part of the island possesses only common European forms, whereas three out of the four species found along the west coast prove to be American. It is pointed out that the formation of gemmules gives to the Spongillidæ more favourable chances of dispersal than are enjoyed by most other animals. Mr. Clement Reid has examined a sample of marl from which skeletons of the Irish elk had been obtained, and finds that it consists largely of *Chara* and *Potamogeton*. He offers an ingenious suggestion to explain the occurrence of skeletons of *Cervus megoceros* in deposits of *Chara*-marl. Those familiar with pools containing *Chara* will be well aware of the appearance of shallowness, and of a solid floor, which is so deceptive. The plants grow to a depth of several feet, but appear to form a carpet of turf just below the surface of the pools; any animal treading on this turf would immediately plunge head-foremost into the water, and in the case of the elk the antlers would almost inevitably become entangled among the stems of *Chara* and other still tougher pondweeds. This entanglement theory accounts very well for the fact that the remains of stags are far more abundant than those of hinds.

A photograph of the late Prof. J. D. Dana, taken about six weeks before his death, is reproduced in the current number of the *American Journal of Science*, together with a full biographical notice, and a list of his works.

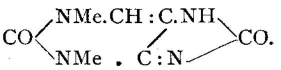
The "Year-Book of Scientific and Learned Societies" in Great Britain and Ireland, the twelfth annual issue of which has just been published by Messrs. C. Griffin and Co., is undoubtedly a very useful handbook of reference. A general idea of the progress of science during the past year can be obtained from the lists of papers subjoined to the designations of the various societies.

In the Michigan Mining School theoretical knowledge seems to be well combined with practical training. We notice in the Calendar, just received, that the elements of astronomy is one of the subjects in which all students are examined for entrance into the School. The course of instruction is arranged so that a good foundation is given in the principles of science, and experience and practice are obtained in every subject taught.

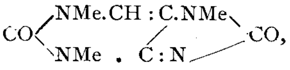
The new editions received during the past week include the first volume of the British Museum "Catalogue of Fishes," containing the Centrarchidæ, Percidæ, and Serranidæ (part), by Mr. G. A. Boulenger, F.R.S. When the first edition of the work was published, in 1859, the Museum collection of fishes comprised 29,275 specimens. The additions since that date have brought the collection up to twice its dimensions at the time when the original catalogue was compiled. The need for revision will, therefore, be fully understood. In the volume which begins the publication of the new edition of the catalogue, Mr. Boulenger confers a benefit upon ichthyologists by omitting seventy-six imperfectly or incorrectly characterised species. The result of this is that, though many new species are included, the present volume contains only fifty-eight more recognised species than the original one. Mr. Boulenger's list gives 375 species, of which 261 are now represented in the British Museum collection, by 2353 specimens.

New editions of two technical manuals have reached us from Messrs. Whittaker and Co. One of these is "Electricity in our Houses and Workshops," an admirable handbook by Mr. S. F. Walker, in which the every-day working of common forms of electrical apparatus is simply described. "The Practical Telephone Handbook," by Mr. Joseph Poole, which is now issued in an enlarged form, should prove of increased value to all interested in the methods of telephone working. A new and enlarged edition (the fourth) of Balfour Stewart's "Lessons in Elementary Physics" has been published by Messrs. Macmillan and Co. In this volume we have a treatise in which the whole domain of physics is covered, and which is so arranged that the connections between the various branches of the subject are clearly brought before the student. Though a quarter of a century old, if the book is brought into line with modern physics from time to time, it will command success for many years to come. "Wild Nature won by Kindness" (Fisher Unwin), has attained the eminence of a sixth edition. Mrs. Brightwen's pleasantly written papers on natural history subjects are evidently appreciated by a large public. Three books by Prof. S. Cooke, of the College of Science, Poona, published by Messrs. George Bell and Sons, have also been received. They are "First Principles of Astronomy" (fifth edition), "First Principles of Chemistry" (sixth edition), and "Test Tables for Qualitative Analysis" (third edition.)

THE synthesis of caffeine is the subject of a short communication to the Berlin Academy by Emil Fischer and Lorenz Ach (*Sitzb. König. Preuss. Akad. Wiss. Berlin*, xiv. p. 261). By the condensation of dimethyl urea and malonic acid the substance $CO:(NMe.CO)_2:CH_2$, is obtained. The nitroso-derivative, $CO:(NMe.CO)_2:CH.NO$, is reduced to dimethyluramil, $CO:(NMe.CO)_2:CH.NH_2$, whence dimethylpseudouric acid, $CO:(NMe.CO)_2:CH.NH.CO.NH_2$, is produced. By abstraction of the elements of water with oxalic acid, dimethyluric acid is formed. This substance is converted into theophylline, an isomeride of theobromine, of the formula



Thence caffeine,



is obtained by the ordinary methyl iodide reaction. As this is the first synthesis of caffeine, details of the methods used will be looked forward to with considerable interest.

THE observation by Martin Freund and Ernst Göbel, that thebaïne is a derivative of phenanthrene (*Ber.* 28, 7, 941) brings this alkaloid into line with morphine and codeïne as instances of the few natural phenanthrene derivatives yet known. Thebaïne is related to dihydrophenanthrene in the same manner as morphine and codeïne are connected with tetrahydrophenanthrene.

THE additions to the Zoological Society's Gardens during the past week include a Vervet Monkey (*Cercopithecus lalandii*, ♀) from Natal, presented by Mr. Alfred James; a Common Jackal (*Canis aureus*), two Bengal Foxes (*Canis bengalensis*), a Jungle Cat (*Felis chaus*) from India, presented by Dr. John Anderson, F.R.S.; two Short-tailed Capromys (*Capromys brachyurus*) from Jamaica, presented by Mr. Frank Cundall; a Dorsal Squirrel (*Sciurus hypopyrrhus*) from Central America, presented by Mrs. Brett; five Squirrel-like Phalangers (*Belideus sciureus*) from Australia, presented by the Right Hon. Earl Cadogan, K.G., a Cambayan Turtle Dove (*Turtur senegalensis*) from West Africa, presented by Mr. C. L. Sutherland; a Salle's Amazon (*Chrysotis sallæ*) from St. Domingo, presented by Mr. W. Windsor Spriggs; a Spotted Salamander (*Salamandra maculosa*), European, presented by Mr. E. Layton Bennett; two Great Wallaroos (*Macropus robustus*, ♂ ♀), two Agile Wallabies (*Halmaturus agilis*) from Australia, a Blue and Yellow Macaw (*Ara ararauna*) from South America, deposited; two Canada Geese (*Bernicla canadensis*) from North America, two Yellowish Weaver Birds (*Sitagra luteola*) from Tropical Regions, thirteen Green Lizards (*Lacerta viridis*) from Jersey, purchased; a Malaccan Parrakeet (*Palæornis malaccensis*) from Malacca, a Nicobar Pigeon (*Calænas nicobarica*) from the Indian Archipelago, received in exchange; a Bennett's Wallaby (*Halmaturus bennetti*, ♂), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

STARS WITH REMARKABLE SPECTRA.—At those stages of celestial evolution in which the temperature is low, it is probable that the average condensing body will not be very bright, so that the study of their spectra at these phases of their development presents some difficulties. Thus, the great majority of the stars with bright-line spectra, and stars showing intense carbon absorption, are of low magnitudes, and because comparatively few were identified in the earlier surveys of stellar spectra, they were looked upon as "peculiar." Nevertheless, a study of these spectra in relation to those of the brighter stars indicated that they probably represented stages in the history of all condensing bodies, so that their discovery in greater numbers was only to be expected. At Harvard College especially has the photographic investigation of these faint spectra been carried on, and the discovery of eleven more objects with peculiar spectra has been recently announced by Mrs. Fleming; two of these are simply stated to be "peculiar," three are nebulæ with bright lines, two have the F line of hydrogen bright, two appear to be bright-line stars of the Wolf-Rayet type, and two show carbon absorption. In addition, the spectra of eleven stars of the α Herculis type were found to show the F line of hydrogen bright, and this unfailing sign of variability in this group of stars is fully substantiated by an examination of chart plates of the same regions (*Astrophysical Journal*, May.) In his observations of the visual spectra of faint stars, Rev. T. E. Espin has discovered numerous objects which he describes as "remarkable." (*Ast. Nach.* 3286.) Most of these, however, appear to be of the α Herculis type; but some are spectra in which carbon absorption is predominant (Group VI.). The most interesting observations by Mr. Espin are those of variable stars, and they tend to show that, in the stars of Group VI., the variability is accompanied by spectroscopic variations which render it difficult to distinguish them from stars of Group II., in which the carbon flutings are bright.

THE PARIS OBSERVATORY.—The annual report for 1894 indicates a high state of activity in this institution, in many directions besides those with which occasional published papers have made us familiar. Great progress has been made with the star catalogue initiated by Admiral Mouchez in 1882, comprising 350,000 observations made between 1837 and 1881; two additional volumes will be published during the present year, and the last two in 1899; a supplementary couple of volumes, dealing with observations made since 1881, will also be issued very shortly. The number of meridian observations during last year amounted to over 18,000, while observations of sun, moon, and planets total 455. Comets, minor planets, and double stars have also received a vast amount of attention. For the great photographic chart, 278 negatives were taken during the year, and the positions of nearly 33,000 stars on various plates have been measured under the direction of Mdlle. Klumpek.

The reduction of these measures was seriously commenced in November, and up to the end of the year the measures of 11 plates, showing 1760 stars, were completely reduced. Meteorological observations on the usual plan were continued regularly.

The magnificent work on lunar photography with the equatorial coudé, as well as the spectroscopic researches of M. Deslandres, have already been referred to in our columns.

THE ACTION OF LIGHT ON ANIMAL LIFE.

ALTHOUGH a number of investigations have been made on the action of light on bacteria, very few experiments have been carried out to ascertain how direct insolation affects animals inoculated with particular disease microbes. Does exposure to sunshine increase or diminish an animal's susceptibility to disease? De Renzi was, we believe, the first to study this question experimentally, and he endeavoured to answer it as regards tuberculosis by inoculating guinea-pigs with tuberculous material. Some of the animals he kept in glass boxes exposed to the direct rays of the sun for five or six hours daily, whilst others were placed in the sunshine, but instead of glass, wooden boxes were used. De Renzi found that, whilst the guinea-pigs in glass boxes —to which, therefore, the maximum amount of sunshine had access—died after 24, 39, 52, and 89 days, those in the opaque wooden boxes died after 20, 25, 26, and 41 days. Thus it would appear that sunshine materially assisted these animals in combating with tuberculous disease, for those individuals deprived of sunshine succumbed far more rapidly.

More recently, Dr. Masella has carried out a series of similar experiments with guinea-pigs inoculated, however, with cholera